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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/689,001 | 10/20/2003 | Gayatri Vyas | 8540G-236COA | 4101 |

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| EXAMINER | |
|---|---|
| ALEJANDRO, RAYMOND | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1745 | |

DATE MAILED: 12/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/689,001 | VYAS ET AL. | |
| | Examiner | Art Unit | |
| | Raymond Alejandro | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *03 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-25, 29-53* is/are pending in the application.

4a) Of the above claim(s) *23-25 and 29-53* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/004322.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

This document is being provided in response to applicant's communication dated 11/03/06. The applicant has overcome the objections and the art rejection over Anderson et al'417. Refer to the abovementioned amendment for more details on applicant's rebuttal arguments and remarks. Therefore, the instant claims are finally rejected over the previous grounds of rejection as set forth hereinbelow and for the reasons of record:

### *Election/Restrictions and Claim Disposition*

*1.* Claims 26-28 and 54 have been cancelled.

2. Claims 23-25 and 29-53 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention/species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 07/20/06.

### *Claim Objections*

3. Claims 31-42 are objected to because their status identifiers are incorrect. Note that claims 31-42 also have been withdrawn from consideration. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 3, 13 and 15-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Tateishi et al 5643690.

The present claims concerns an electrochemical cell wherein the disclosed inventive concept comprises the specific metal oxide coating.

As to claim 1:

Tateishi et al divulge a fuel cell provided with an oxidizing gas side-collector plate (*the electrically conductive contact element facing the electrode*) having on it surface a composite oxide layer excellent in electric conductivity and corrosion resistance (ABSTRACT/ CLAIM 1). The collector plate disposed on the cathode side and comprises a main body made of SS, an Fe-Cr-Ni based alloy layer covering surface thereof; and a nickel-ferrite based composite oxide layer formed on a surface of the Fe-Cr-Ni alloy layer (Abstract/claim 1). Disclosed is the presence of an electrolyte body 1 formed of a porous body impregnated therein with an electrolyte including at least a carbonate such as Li-carbonate (COL 3, lines 46-50). Figure 1 also illustrates the electrolyte body 1 separating respective electrodes (See FIGURE 1). *This represents the ion-conducting membrane because it contains the electrolyte.* **Figure 2** below illustrates cathode 3, the specified collector plate 5 and interconnect 8:

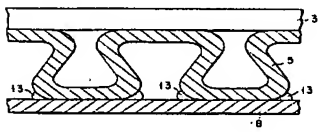


FIG. 2

As to claims 3 and 15:

The collector plate has a main body made of SS, an Fe-Cr-Ni based alloy layer covering surface thereof; and a nickel-ferrite based composite oxide layer formed on a surface of the Fe-Cr-Ni alloy layer (ABSTRACT/ CLAIM 1). The composite oxide layer excellent in electric conductivity and corrosion resistance (ABSTRACT/ CLAIM 1).

As to claim 13:

Collector plate 5 serves to feed gas therethrough (COL 8, lines 65-67/ See FIGURE 2).

As to claim 16:

Disclosed is the inclusion of an Fe-Cr-Ni based alloy layer covering surface thereof (ABSTRACT/ CLAIM 1). *It is contended that this specific layer serves as the electrically conductive open cell foam layer.*

As to claims 17-21:

Collector plate 5 serves to feed gas therethrough (COL 8, lines 65-67/ See FIGURE 2). **Figure 2** depicts collector plate 5 having first and second fluid distribution surfaces (opposed surfaces). This configuration encompasses distributing grooves (open spaces) and lands (surfaces contacting cathode 3 and/or interconnect 8)..

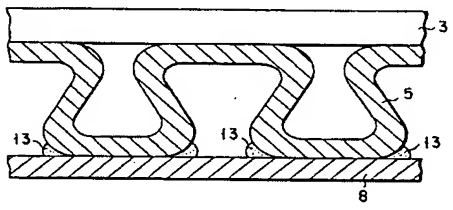


FIG. 2

Thus, the present claims are anticipated.

6. (***At least***) Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by the Japanese publication JP 08-185870 (herein called the JP'870).

The JP'870 discloses a separator for a solid electrolytic fuel cell composed of a cermet material consisting of metal alloy material and a metal oxide protection film (ABSTRACT). **Figure 1** illustrates the structure of the fuel cell including the separators 14, and end plates 15-16 facing the electrode. *The electrically conductive property of the metal oxide film is inherent to the composition itself.*

Thus, the present claim is anticipated.

7. (***At least***) Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Gyoten et al 7005205.

Goyten et al disclose a polymer electrolyte fuel cell having an electrolyte membrane electrode assembly and is characterized by having at least one electroconductive separator having a metal substrate and an electroconductive resin layer thereon and contacting the electrolyte membrane assembly (ABSTRACT) and including a metal oxide layer therebetween (EMBODIED EXAMPLE 6, COL 8, lines 35-52). *The electrically conductive property of the metal oxide film is inherent to the composition itself.*

Gyoten et al teach that the oxide layer is situated between the metal substrate 1 and said electroconductive resin layer 2 (COL 8, lines 48-52/CLAIM 2). Notice also the presence of pin-hole 8 and gas diffusion electrode 4 (See FIGURE 1/COL 6, lines 12-30). *Given that pin-hole 8 directly provides an open path therebetween, it can be said that reactant gas diffusing through gas diffusion electrode also diffuses through the electroconductive resin layer 2. Therefore, said*

*reactant gas contacts or communicates with the oxide layer placed between the metal substrate 1 and said electroconductive resin layer 2.*

Thus, the present claim is anticipated.

8. ***(At least)*** Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Hwang et al 6090228.

Hwang et al disclose a fuel cell (TITLE) including a separator made of SS base material and further including a coating comprising at least a thin Al-oxide film thereon (ABSTRACT/COL 3, lines 64-66). **Figure 1** illustrates separators 40a, 40b facing anode electrode 10a or cathode electrode 10b (COL 1, lines 28-38/ FIGURE 1). *The electrically conductive property of the metal oxide film is inherent to the composition itself.*

Hwang et al disclose the presence of matrixes 20a and 20b containing and supporting the molten carbonate of an electrolyte (COL 1, lines 30-37/ See Figure 1). *These matrixes represent the ion-conducting membrane because it contains the electrolyte.*

Thus, the present claim is anticipated.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 2, 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tateishi et al 5643690 as applied to claims 1 and 13 above, and further in view of Gordon 4146657.

Tateishi et al is applied, argued and incorporated herein for the reasons expressed above. However, the preceding prior art does not expressly disclose the specific fluorine doped tin oxide film.

Gordon disclose electrically conductive films of tin oxide comprising fluorine (ABSTRACT/COL 1, lines 5-25); fluorine doped stannic oxide (COL 2, lines 38-42). The coating is an electrically conductive coating (COL 1, lines 24-28/COL 2, lines 38-42) finding application in electrochemical systems or environments (COL 1, lines 12-18). The film material also exhibits good match of thermal expansion coefficient (COL 9, lines 33-42). The film includes 1-2.5 % of fluorine (COL 7, lines 10-12).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific fluorine doped tin oxide of Gordon in the electrochemical cell of Tateishi et al because Gordon

directly teaches that such specific oxide films find application in electrochemical systems or environments due to their high electrical conductivity and suitable thermal expansion coefficient.

12. Claims 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tateishi et al 5643690 as applied to claim 1 above, and further in view of Applicant's Admitted Prior Art (heretofore 'the AAPA').

Tateishi et al is applied, argued and incorporated herein for the reasons expressed above.

As to claims 9-10:

Tateishi et al further disclose the main body of the collector plate is made of SS, an Fe-Cr-Ni based alloy layer covering surface thereof; and a nickel-ferrite based composite oxide layer formed on a surface of the Fe-Cr-Ni alloy layer (ABSTRACT/ CLAIM 1).

As to claim 11:

*As to the method limitation, i.e. the welded or braised metal sheet, it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.*

However, the preceding prior art does not expressly disclose the specific particle-binder matrix or graphite-filler-matrix substrates; and the specific conductive open cell foam layer.

As to claims 4-5 and 12:

The AAPA discloses that substrate forming the contact element comprises an electrically conductive composite material being a polymer having conductive powder embedded therein,

wherein the conductive particles are typically graphite carbon or metal (*Applicant's specification at paragraphs 0076*). Further disclosed is the inclusion of one or more layers disposed between the coating and the substrate, or the substrate itself having multiple layers (*Applicant's specification at paragraphs 0075).*

As to claims 6-8:

The AAPA mentions the use of a bipolar plate featuring a thin barrier sheet including foam and having a thickness which is being attached by welding or brazing; and forming fluid flow fields. Such a foam has opposed surfaces, is electrically conductive; it can be prepared as metal foams or carbon-based graphite foams (*Applicant's specification at paragraph 0077*).

In view of the above, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific particle-binder matrix or graphite-filler-matrix substrates of the AAPA in the electrochemical cell of Tateishi et al as the AAPA discloses such specific substrates enhance electrical contact between the composite element and the next adjacent fuel cell element. Thus, electrical conductivity and contact is improved.

With respect to the specific conductive open cell foam layer, it would have been obvious to a person possessing a level of ordinary skill in the field of invention at the time the invention was made to use the specific conductive open cell foam layer of the AAPA in the electrochemical cell of Tateishi et al as the AAPA teaches that such a foam layer forms an electrically conductive element. Thus, electrical conductivity and contact is improved.

***Response to Arguments***

13. Applicant's arguments against the rejection based upon Anderson et al'417, with respect to claim 1, have been fully considered and are persuasive.

14. Applicant's arguments filed 11/03/06 have been fully considered but they are not persuasive.

15. With respect to the rejection based on Tateishi et al and Hwang et al, applicant has articulated that their "*teachings are applicable to molten carbonate fuel cells. Molten fuel cells utilize a molten mixture of carbonate salts, not a membrane, as the electrolyte.*" However, this is an incorrect assertion. For instance, conventional molten carbonate fuel cells contain a matrix further containing/supporting a carbonate material which melts (become molten) when the fuel cells approach their operating temperature of approximately more than 600 °C. In favor of this, please note the specific electrolyte arrangement of Tateishi et al and Hwang et al, respectively:

- Disclosed is the presence of an electrolyte body 1 formed of a porous body impregnated therein with an electrolyte including at least a carbonate such as Li-carbonate (Tateishi et al COL 3, lines 46-50). Figure 1 also illustrates the electrolyte body 1 separating respective electrodes (See FIGURE 1 of Tateishi et al). *This represents the ion-conducting membrane because it contains the electrolyte.*

- Hwang et al disclose the presence of matrixes 20a and 20b containing and supporting the molten carbonate of an electrolyte (Hwang et al at COL 1, lines 30-37/ See Figure 1). *These matrixes represent the ion-conducting membrane because it contains the electrolyte.*

16. In relation to the rejection based upon the Gyoten et al reference, applicant has further articulated that the reference "*fails to teach a metal oxide coating in communication with a*

*reactant gas*". Interestingly, applicant has admitted that "*The oxide layer, being sandwiched between the substrate and the resin layer, prevents contact between the oxide layer and the reactant gas*" (See amendment dated 11/03/06 at page 16, last sentence of 2nd full paragraph). This applicant's statement or admission contributes to the position taken by the examiner because the oxide is formed on the surface of the metal substrate 1 facing the gas diffusion electrode 4. Accordingly, reactant gas diffuses through pinhole 8 in the resin layer 2 and contacts the oxide layer deposited between the resin layer 2 and the metal substrate 1. Since the oxide layer prevents contact between the reactant gas and the metal substrate, it can be said that the oxide layer is acting as a direct barrier therebetween. Meanwhile, the oxide layer per is in direct contact with the reactant gas, and therefore in communication therewith.

Stated alternatively, Gyoten et al teach that the oxide layer is situated between the metal substrate 1 and said electroconductive resin layer 2 (COL 8, lines 48-52/CLAIM 2). Notice also the presence of pin-hole 8 and gas diffusion electrode 4 (See FIGURE 1/COL 6, lines 12-30). Given that pin-hole 8 directly provides an open path therebetween, it can be said that reactant gas diffusing through gas diffusion electrode also diffuses through the electroconductive resin layer 2. Therefore, said reactant gas contacts or communicates with the oxide layer placed between the metal substrate 1 and said electroconductive resin layer 2.

17. With respect to the rejection based upon the JP'870, applicant has expressed that it "*teaches a protection film of metallic oxide laid on the gas concordant surface of the cathode 12 of the substrate 14 in such a state as not being in direct contact with the cathode gas*". In this respect, the examiner indicates herein that applicant is mischaracterizing the teachings of the JP'870. If the protection film of metallic oxide laid on the gas concordant surface of the cathode

12 of the substrate 14, it is necessarily in contact, directly or indirectly, with the reactant gas because the cathode structure of the specific fuel cell disclosed by JP'870 is generally porous. Because this cathode structure has pores therein/thereon, the protection film is laid on the cathode structure. When reactant gas diffuses through this cathode structure, it also diffuses all around this cathode structure as long as this cathode structure is porous. Therefore, reactant gas reaches, touches or contacts the metal oxide layer. Unless applicant shows that reactant diffusion occurs unidirectionally in the cathode structure, it is believed that gas diffusivity is governed by entropy phenomena and gas diffusion theory, thereby inducing or stimulating gas diffusion all across any body.

Applicant has also expressed that the JP'870 does not disclose "*being in direct contact with the cathode gas*". However, applicant is reminded that the present claims are entirely silent about this limitation. They require only to be "*in communication with a reactant gas*". Applicant's expression is found to be not commensurate in scope with the claimed invention.

***Conclusion***

18. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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